AS

Notice of Allowability	Application No.	Applicant(s)
	09/924,333	SHIRLEY, PAUL D.
	Examiner	**Art Unit**
	Rudy Zervigon	1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *a request for continued examination under 37 CFR 1.114*.

2. ☒ The allowed claim(s) is/are *1,2,4,5,7-10,13-32 and 34-48*.

3. ☒ The drawings filed on *07 August 2001* are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
   1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

EXAMINER'S AMENDMENT

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 11, 2004 and December 2, 2003 has been entered.

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Kim Jung Ing on April 27, 2004.

The application has been amended as follows:

IN THE CLAIMS:

Claim 1 (currently amended): An apparatus for controlling a temperature of a microelectronic substrate, the substrate having a first surface and a second surface opposite the first surface, the apparatus comprising: a substrate support having at least one support surface for engaging and supporting the substrate, the support surface being rotatable about an axis extending through the substrate and perpendicular to the first surface and the second surface; and a temperature

controller positioned at least proximate to the substrate support, the temperature controller having a first thermal link coupled with a first portion of the substrate and a second thermal link coupled with a second portion of the substrate, the first and second thermal links being separately controllable for transferring heat to or from the first and second portions of at least one of the first and second surfaces at different rates. wherein the first thermal link comprises a first nozzle configured to direct a first fluid stream toward the first portion of the substrate. and the second thermal link comprises a second nozzle configured to direct a second fluid stream toward the second portion of the substrate.

2. (Original) The apparatus of claim 1 wherein the temperature controller is fixed relative to the substrate when the substrate is supported by the substrate support.

3. (Cancelled)

4. (Original) The apparatus of claim 1, further comprising a liquid supply conduit having an opening for dispensing a liquid onto the substrate.

5. (Previously Presented) The apparatus of claim 4 wherein the supply conduit is positioned adjacent the first surface of the substrate when the substrate is supported by the substrate support for disposing the liquid on the first surface, further wherein the first and second thermal links are positioned adjacent the second surface for transferring heat to or from the second surface.

6. (Cancelled)

7. (Currently amended) The apparatus of claim [6] 1, further comprising a source of compressed gas coupled to the first and second nozzles.

8. (Original) The apparatus of claim 7, wherein the source of compressed gas includes a source of compressed air.

9. (Currently amended) The apparatus of claim [6] <u>1</u>, further comprising a manifold coupled to the first and second nozzles.

10. (Currently amended) The apparatus of claim [6] <u>1</u>, further comprising a source of liquid coupled to the first and second nozzles.

11-12. (Cancelled)

13. (Original) The apparatus of claim 1 wherein the first thermal link is coupled directly with the first portion of the substrate and the second thermal link is coupled directly with the second portion of the substrate.

14. (Original) The apparatus of claim 1 wherein the first thermal link includes a first electrical element spaced apart from the first portion of the substrate and the second thermal link includes a second electrical element spaced apart from the second portion of the substrate.

15. (Previously Presented) The apparatus of claim 14 wherein the substrate support includes at least one standoff having an engaging surface for engaging the substrate, the engaging surface being spaced apart from the first and second electrical elements.

16. (Original) The apparatus of claim 14 wherein the first electrical element includes a first thermoelectric device and the second electrical element includes a second thermoelectric device, the thermoelectric devices configured to generate a heating effect when current is passed through the devices in a first direction and a cooling effect when current is passed through the devices in an opposite direction.

17. (Original) The apparatus of claim 1 wherein the substrate support is rotatable about a rotation axis and the first thermal link is spaced apart from the rotation axis by a first distance and the

second thermal link is spaced apart from the rotation axis by a second distance different than the first distance.

18. (Original) The apparatus of claim 1 wherein the substrate support is rotatable about a rotation axis that extends through the first thermal link.

19. (Original) The apparatus of claim 1 wherein the first and second thermal links are annular relative to an axis extending generally perpendicular to at least one of the first and second surfaces of the substrate.

20. (Original) The apparatus of claim 1 wherein the first and second thermal links are concentric relative to an axis extending generally perpendicular to at least one of the first and second surfaces of the substrate.

21. (Original) The apparatus of claim 1 wherein the first thermal link includes a heat source.

22. (Original) The apparatus of claim 1 wherein the first thermal link includes a cooling source.

23. (Original) The apparatus of claim 1 wherein the substrate support includes rotatable chuck for releasably engaging the substrate.

24. (Original) The apparatus of claim 1 wherein the substrate support includes an upwardly facing bowl for retaining excess fluid that drips from the substrate.

25. (Original) The apparatus of claim 1 wherein the temperature controller includes a temperature sensor for monitoring at least one temperature of the substrate, further wherein the temperature sensor is coupled to the first and second thermal links to maintain the first and second portions of the substrate at approximately the same temperature.

26. (Currently Amended) An apparatus for controlling a temperature of a microelectronic substrate, the substrate having a first surface and a second surface opposite the first surface, the

apparatus comprising: a substrate support having an engaging surface positioned to support a peripheral portion of the second surface of the substrate, the substrate support having an open portion projecting through the substrate support and adjacent the second surface of the substrate to allow direct thermal contact with the second surface, the support being rotatable about an axis extending through the substrate and perpendicular to the first surface and the second surface; and a temperature controller coupled to a source of gas, the temperature controller having at least [one] two orifices proximate to the substrate support for directing a flow of the gas through the at least [one] two orifices that directly impinge against the second surface of the substrate.

27. (Original) The apparatus of claim 26 wherein the engaging surface of the substrate support is rotatable relative to the orifice of the temperature controller to rotate the substrate relative to the orifice.

28. (Original) The apparatus of claim 26 wherein the orifice is a first orifice aligned with a first portion of the substrate, the source of gas having a second orifice aligned with a second portion of the substrate, the temperature controller being controllable to transfer heat at a first rate to or from the substrate through the first orifice, the temperature controller being controllable to transfer heat at a second rate to or from the substrate through the second orifice.

29. (Original) The apparatus of claim 26 wherein the source of compressed gas includes a source of compressed air.

30. (Original) The apparatus of claim 26 wherein the source of gas has a temperature less than a temperature of the substrate to cool the substrate.

31. (Original) The apparatus of claim 26 wherein the source of gas has a temperature greater than a temperature of the substrate to heat the substrate.

32. (Original) The apparatus of claim 26, further comprising: a liquid supply conduit having an opening positioned proximate to the substrate support for disposing a liquid on the substrate; and a source of the liquid coupled to the liquid supply conduit.

33. (Cancelled)

34. (Previously Presented) The apparatus of claim 26 wherein the substrate support is rotatable about a rotation axis that is approximately perpendicular to the first and second surfaces and the first thermal link is spaced apart from the rotation axis by a first distance and the second thermal link is spaced apart from the rotation axis by a second distance different than the first distance.

35. (Original) The apparatus of claim 26 wherein the substrate support includes a rotatable chuck for releasably engaging the substrate.

36. (Previously Presented) The apparatus of claim 26 wherein the substrate support includes an bowl for retaining excess fluid that drips from the substrate, the bowl facing upwardly towards the second surface.

37. (Previously Presented) An apparatus for controlling a temperature of a microelectronic substrate, the substrate having a first surface and a second surface opposite the first surface, the apparatus comprising: a substrate support having at least one support surface for engaging and supporting the substrate, the at least one support surface being rotatable about an axis extending through the substrate and perpendicular to the first surface and the second surface; and a temperature controller positioned at least proximate to the substrate support and being generally fixed relative to the substrate when the substrate is supported by the substrate support, the temperature controller having a first thermal link coupled directly with a first portion of the substrate and a second thermal link coupled directly with a second portion of the substrate, the

first and second thermal links being separately controllable for directing a first fluid stream and a second fluid stream to the respective first and second portions of the substrate to transfer heat to or from the first and second portions of the substrate at different rates.

38. (Original) The apparatus of claim 37 wherein the first thermal link includes a first nozzle having a first orifice directed toward the first portion of the substrate and the second thermal link includes a second nozzle having a second orifice directed toward the second portion of the substrate.

39. (Original) The apparatus of claim 38, further comprising a source of compressed gas coupled to the first and second nozzles.

40. (Original) The apparatus of claim 38, further comprising a source of liquid coupled to the first and second nozzles.

41. (Original) The apparatus of claim 37 wherein the first thermal link includes a first electrical element spaced apart from the first portion of the substrate and the second thermal link includes a second electrical element spaced apart from the second portion of the substrate.

42. (Original) The apparatus of claim 41 wherein the first electrical element includes a first thermoelectric device spaced apart from the first portion of the substrate and the second electrical element includes a second thermoelectric device spaced apart from the second portion of the substrate.

43. (Original) The apparatus of claim 38 wherein the first thermal link includes a heat source.

44. (Original) The apparatus of claim 38 wherein the first thermal link includes a cooling source.

45. (Previously Presented) An apparatus for controlling a temperature of a microelectronic substrate having a first surface and a second surface opposite the first surface, the apparatus

comprising: a first substrate support configured to engage the substrate, the substrate support being rotatable about an axis extending through the substrate and perpendicular to the first surface and the second surface; a first temperature controller proximate to the first substrate support to transfer heat to or from the substrate while the substrate is engaged by the first substrate support in a generally stationary position relative to the first temperature controller, the first temperature controller having a first thermal link coupled directly with a first portion of the substrate and a second thermal link coupled directly with a second portion of the substrate, the first and second thermal links being separately controllable for transferring heat to or from the first and second portions at different rates by impinging a first fluid stream and a second fluid stream against respective first and second portions of the substrate; a second support proximate to the first support and configured to engage the substrate while a liquid material is applied to the substrate, the second support having a rotatable portion for rotating the substrate; a second temperature controller proximate to the second substrate support to transfer heat to or from the substrate while the liquid material is applied to the substrate and while the substrate rotates, the second temperature controller having a third thermal link directly coupled with the first portion of the substrate and a fourth thermal link directly coupled with the second portion of the substrate, the third and fourth thermal links being separately controllable for transferring heat to or from the first and second portions at different rates by impinging a third fluid stream and a fourth fluid stream against respective third and fourth portions of the substrate; and a liquid supply conduit having an opening for dispensing the liquid material onto the substrate when the substrate is supported by the second support.

46. (Original) The apparatus of claim 45 wherein at least one of the temperature controllers includes a first nozzle having a first orifice directed to the first portion of the substrate and a second nozzle having a second orifice directed to the second portion of the substrate, the first and second nozzles being coupled to a source of gas for controlling the temperature of the substrate.

47. (Original) The apparatus of claim 45 wherein at least one of the temperature controllers includes a first electrical element spaced apart from the first portion of the substrate and a second electrical element spaced apart from the second portion of the substrate.

48. (Original) The apparatus of claim 47 wherein the first electrical element includes a first thermoelectric device and the second electrical element includes a second thermoelectric device.

49-77. (Cancelled)

Allowable Subject Matter

3. Claims 1, 2, 4, 5, 7-10, 13-32, and 34-48 are allowed.

4. The following is an examiner's statement of reasons for allowance: The closest prior art is to Hagge et al (U.S.Pat. 3,710,251) and Suzuki et al (U.S.Pat. 5,474,877). Hagge teaches a first thermal link (item 27, Figure 2; column 4, lines 19-52) includes a first nozzle (22, Figure 1) having a first orifice (23, Figure 1,2) directed toward the first portion (side of 11 closest to 27) of the substrate (item 11, Figure 1,2; column 4, lines 20 -51) and the second thermal link (item 26, Figure 2; column 4, lines 19-52) includes a second nozzle (20, Figure 1,2) having a second orifice (21,Figure 1,2, Figure 1,2) directed toward the second portion (side of 11 closest to 26) of the substrate (item 11, Figure 1,2; column 4, lines 20 -51). However, Hagge's first thermal link functions to withdraw a fluid stream from the substrate. Further, Hagge and none of the cited

prior art teach plural thermal links that directs a fluid stream to the at least one of the first and second surfaces of the substrate.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272.1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official after fax phone number for the 1763 art unit is (703) 872-9306. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Gregory L. Mills, at (571) 272-1439.

JEFFRIE R. LUND
PRIMARY EXAMINER